**Review for Test 2  
Math 230: Differential Equations**

**Format**

* The exam will contain 8 problems (plus or minus 3) and will last 50 minutes.
* It is a paper and pencil exam.
* You will need to show your work.
* You may use a graphing calculator. However, you may not use a symbolic calculator such as the TI-89. If you do not bring an acceptable calculator, you may have to do without.
* You must be able to answer warm up questions and paraphrase mathematical quotes such as those found at:   
    
  http://www-groups.dcs.st-andrews.ac.uk/~history/Quotations/Erdos.html

**Basic Content.**

* You are responsible for sections 3.1-2 and 4.1-4, 6-7.
* In addition to the material covered in the class, you are responsible for all of the basic facts you have learned since kindergarten. These include the facts that Barack Obama is the President of the United States of America, , and that 1/0 is undefined.

**In Studying . . .**

* You should be able to recreate every derivation/proof done in class (which isn’t very many).
* You need to know the vocabulary.
* You must recognize the various forms and know the appropriate methods for solving each DE.
* You should be able to solve every example done in class.
* You should be able to solve every homework question.
* Notes: At least some of the DE’s you must solve will be labeled by type.
* Note: I will include a basic integral table with the exam (see attached)

**Ideas that may help with test prep …**

* Review the most recent material first.
* Consider recopying your notes.
* Summarize your notes. Make note cards for important formulas and definitions. Set them aside once the definitions are known.
* Rework examples from class and homework questions (in this order).
* Look to the review exercises for additional practice.
* Practice like you will play – do you know the material without your notes when the clock is running?
* Study with a friend to have more fun.
* Look to online resources such as YouTube and the Khan Academy to fill in holes.
* Show up at least five minutes early for the exam.

**A Summary of the Topics (not necessarily exhaustive)**

* 3.1: Linear Models
  + Set up and solve DEs to model population
  + Set up and solve half-life DE models
  + Set up and solve mixture DE models
  + There won’t be circuit questions on the exam
* 3.2: Non-linear Models
  + Set up and solve logistic population models
  + There won’t be chemistry questions on the exam
* 4.1: Preliminary Theory – Linear Equations
  + IVPs vs BVPs
  + Definition of a linear DE (homogeneous and non-homogeneous)
  + Linear independence, the Wronskian, and the general solution
  + Superposition in its many forms
  + The fundamental set
  + The complementary and particular solutions to a nonhomogeneous DE
* 4.2: Reduction of Order
  + Use one solution to find another
* 4.3: Homogeneous Linear Equations with Constant Coefficients
  + Form (when the method applies)
  + Method
  + Three cases
* Undetermined Coefficients – Superposition Approach
  + Form (when it applies)
  + Finding the complementary solution
  + Finding the particular solution
    - Know when and how to set up the form of a particular solution
* 4.6: Variation of Parameters
  + Put the DE in standard form to apply this method for finding particular solutions
  + Formula using the Wronskian
  + I will only give you a second-order DE on the exam (no 3x3 Wronskians)
* 4.7: Cauchy-Euler Equations
  + The form
  + The three cases

